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Updating Food Composition Values — A Progress Report

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As nutrition educators, we use many resources for our teaching. Food composition tables are one of these resources. No matter what our approach is in teaching food selection—whether we emphasize foods by using food guides, such as the Basic 4 or Basic 7, or we emphasize the nutrients in foods as in nutrition labeling—knowledge of food values is fundamental.

Tables of food composition used in this country have as their basis tables developed by the U.S. Department of Agriculture. The most comprehensive of these tables is Agriculture Handbook No. 8, "Composition of Foods...raw, processed, prepared." We are frequently questioned about the revision and updating of this handbook, a publication of USDA's Nutrient Data Research Center. Nutrition Program News thus reports on how the Nutrient Data Research

Center, Consumer and Food Economics Institute, Agricultural Research Service, will make available up-to-date information on the nutrient content of foods.

Nutrient Data Bank

The USDA has maintained for many years a repository for food composition information—a nutrient data bank—which now contains results from thousands of nutrient analyses of food items. This information has been collected at the Nutrient Data Research Center primarily by searching the scientific literature, from both the United States and foreign countries, for any reports of research on food composition. Data have also come from unpublished materials derived from research of State agricultural experiment stations, universities, Government-sponsored programs, and some food companies. It is from these files that Agriculture Handbook No. 8 and other USDA food composition tables have been derived.

To facilitate the use of these data, a computerized system for storing and processing the information is being developed. This automated system will greatly increase the volume and detail of information that can be handled and will make the information more readily available for use. The Food and Drug Administration, U.S. Department of Health, Education, and Welfare, and the food industry have cooperated with the Agricultural Research Service, U.S. Department of Agriculture, in this endeavor. Impetus for development of this computer-based nutrient data bank has

For over 30 years, until her retirement in December 1974, Dr. Bernice Watt was responsible for the development of authoritative tables on the nutritional values of all important foods for the USDA. Under her guidance, information on food composition grew from two tables containing data on 13 nutrients in 275 foods to 20 tables containing values for approximately 50 nutrients and 3,000 foods. Immediately preceding her retirement, Dr. Watt was engaged in organizing the computerized Data Bank on food composition which is described in this issue.

come in part from new Federal programs for the voluntary labeling of foods with information on nutrient content—the so-called nutrition labeling. While a number of food companies have routinely analyzed their food products for nutrient content, nutrition labeling has stimulated the industry to produce a greater amount of analytical data on nutrients in foods. Thus, the anticipated volume of data, together with the need for up-to-date food composition tables, has resulted in a pooling of information from new and traditional sources.

Collection of Information

A form (ARS 200, Food Composition Data) has been developed to aid those wishing to contribute data to the data bank. This form has two sections. One section provides for a detailed description to identify the food sample analyzed. This will include generic and scientific name, agricultural production factors related to nutrient content such as breed, sex, age, and feeding practices; variety, maturity, ripeness, season, geographical area, fertilization, and other growing conditions; and the target market. A checklist is provided for product and processing variables including: Treatment applied, preserving and processing techniques, cooking method, physical state, portion analyzed, packaging, and grade. Careful identification is essential for evaluation of data.

The second section of the form is for recording analytical data on proximate composition (protein, fat, total solids, carbohydrate, fiber, and ash); data to establish weight-volume relationships or weights of portion sizes; information on inedible parts; mineral elements including trace elements; vitamins; amino acids; specific carbohydrate fractions; and lipids including fatty acids and cholesterol. Information is requested on sample preparation and methods of analysis as these details are needed to help interpret and evaluate the data.

On August 9, 1973, these forms were made available to researchers. The first completed forms, returned on August 31, 1973, provided data on proximate composition and certain minerals and vitamins in several kinds of pizza. Many additional forms with various kinds of information have been received since that time.

Information will be taken continuously as before from journal articles, special reports, and unpublished sources, and now from Form 200 as they are received.

Coding

All information for an analyzed food sample will be coded before it enters the Data Bank. The coding system consists of (1) Food Terms for classification of foods and

(2) Qualifying Terms for further description of the foods. A four-character alphabet code is used for the food terms. Foods are arranged in 21 major groups according to similar commodity characteristics. The first character in the code designates the major group to which the food belongs.

- A. Meat (other than Poultry)
- B. Dairy Products
- C. Poultry, Reptiles, their Eggs; and Insects
- D. Fishes, Invertebrates, their Eggs and Products
- E. Nuts, Mature Leguminous and other Seeds
- F. Simulated Products (fabricated foods)
- G. Sausages and Luncheon Meats
- H. & I. Mixed Dishes with Animal or Leguminous Protein or both
- J. Soups, Broths, Meat Extracts, Natural Meat Juices
- K. Processed Meals, Meal Replacements, Sandwiches, Hotdogs, Hamburgers, other Bun-type Sandwiches
- L. Cereal Grains and their Milled Products
- M. Bakery Products
- N. Vegetables and Vegetable Products
- O. Fruits and Fruit Products
- P. Mixed Dishes, dessert-type (other than Bakery and Fruit Products)
- Q. Sugars, Syrups, Icings, Baking Chocolate, Cocoa
- R. Fats, Oil, Salad Dressings, Gravies, Sauces
- S. Beverages
- T. Seasonings and Condiments
- U. Leavening Agents and Additives
- V. Baby Foods

The other three characters identify subgroups. For example, the complete food term code OBKF delineates O, the major food group—Fruits; B, the subgroup—Stone Fruit; K, the type of stone fruit—Peach; F, the variety of peach—Elberta. The other food groups are broken down into similar levels of classification.

Qualifying terms allow for even more specificity. A list of over 2,000 terms that may be used as qualifiers has been compiled. These terms include anything which might affect the nutritional quality of a food including all the details from the product and processing checklist recorded on the collection form. Each qualifier has been assigned a unique 4-digit code and while an entry will have only one food term, it may have up to 32 qualifiers to be used in conjunction with the food term. A complete Identification Code, OBKF B003 C103 E019, translates as: Food Term Code—OBKF = Elberta Peach; Qualifiers—B003 = canned, C103 = packed in heavy syrup, and E019 = sliced. Before being coded the data will undergo a screening by nutritionists or chemists at the Nutrient Data Research Center for any

obvious errors in the data presentation; lack of sufficient identification of the food; and adequacy of information on processing, methods of sampling, and analytical procedures.

Nutrient Information System

After the full identification code has been assigned to a food analysis, the code and the nutrient data are ready for entry into the computer. As information is entered, a screening program will check for proper entry and will also make a cross-reference check with built-in parameters for nutrient values to identify values which are above or below those that can be reasonably expected. This program will also, if needed, convert data to a common base, e.g., from ounces to grams. If the nutrient values are outside the preset parameters, or otherwise not in compliance with the instructions in the program, the errors or discrepancies are indicated by the system and the values checked by staff members, corrected if possible, and reentered.

The data stored in the bank will be processed in three different ways. The results of each process will comprise a separate computer file. These will be referred to as Data Bases I, II, and III. The data for individual analyses with detailed information about the food sample will make up Data Base I.

From Data Base I, nutritive values of identical food items—that is, all food items with matching four position food codes and matching qualifiers—will be averaged together, and these averages will comprise Data Base II. Standard error, number of samples, and range of values for each average will also be included. Some food items which are similar but not completely identical may be averaged together for this file if there is no great variability in nutrient content. For example, different varieties of apples may be averaged together or they may be summarized separately, depending on the degree of variability. Another example, all canned peas may be averaged together, but if the type of canning process makes a difference in the nutrient values, then they may be summarized according to the type of canning process. A great deal of detail about a food is still maintained in Data Base II. From Data Base II, additional averaging of nutrient values will take place so that, generally, one entry representative of a food will remain.

These final averages will comprise Data Base III. When data warrant, values for important sub-groups will be included to reflect influence of factors such as variety, period of harvest, or growing location. For example, Data Base III will contain one entry giving representative nutrient values for all oranges grown in the United States and may also contain data separately for oranges grown in California or Florida. Standard error, number of samples, and range of values will be present in this file, also. Information

requests will be processed according to the type of information wanted. A chemist involved in nutrient analyses on a particular variety of an apple, such as a McIntosh, would want to compare results to data from Data Base II, while a dietitian planning a school lunch would need the less detailed data from Data Base III.

Handbook No. 8

The aim in deriving nutritive values for basic tables of food composition is to provide values that are representative of products and a year-round, countrywide basis. Thus, the next edition of Agriculture Handbook No. 8 will contain information from Data Base III.

The Handbook will be released by food groups. The first food groups to be released will be Dairy and Egg Products, Spices and Herbs, and Baby Foods.

Values for more foods and on more nutrients will be provided than are found in the present edition of Handbook No. 8. Current plans are to add data for zinc, folacin, vitamins B₆ and B₁₂, pantothenic acid, amino acids, and several fatty acids to those nutrients currently found in the Handbook. Energy values will be reported in kilojoules as well as kilocalories.

Conclusion

Tables of food composition are needed by dietitians, nutritionists, research scientists, health workers, physicians, economists, and others.

They are used for appraisal of diets and food supplies, background for many types of research in foods and nutrition, food production planning in the United States, developing programs for food distribution, basis for food and dietary standards in regulatory programs, and developing materials to help in dietary planning and food selection.

Nutritionists take the findings of research on (1) desirable nutrient intakes as interpreted by the National Research Council in its Recommended Dietary Allowances and (2) the kinds and amounts of nutrients as interpreted in tables of food composition and develop plans to assist people move toward desirable levels of health. To assist the transference of these research findings from the laboratory to the dining table, food guides such as the Basic 4 and Basic 7 and the Type A pattern for school lunch were developed for use in directing food choices. Food Exchange Lists are examples of guides developed for use in planning therapeutic diets. These food guides are used by individuals and families in selecting combinations of food that will meet the needs of all individuals for nutrients and food energy.

Thus, the tables of food composition that list the nutritive content of foods are a basic tool for the nutrition educator to use in translating nutrition facts into nontechnical language for the general public.

Publications

There have been many publications since the first USDA preliminary tables of food composition were published in 1892. The following is a list of current articles published in professional journals and USDA publications on nutrient data. Included in the list are USDA publications that are out of print but are available through library loan. Listing of these publications is for the information of the reader. Information on the USDA publications may be obtained from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (Reference symbol—GPO.)

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